Math 370-Fall 2022

$$\begin{pmatrix} Introduction\ to\ Combinatorics \\ uricIindcosC\ monobaoirto\ tntt \end{pmatrix}$$

General information

    Class location: Cupples II L015
    Class time: TTh 1-2:20pm
    Professor: Greg Knese
    Office location: Cupples I room 214
    Office hours: M 1:30-3pm, W 12-1:30pm
    Email: geknese at wustl dot edu

Course description

Basics of enumeration (combinations, permutations and enumeration of functions between finite sets), generating functions; the inclusion-exclusion principle, partition theory and introductory graph theory. As time permits, additional topics may include Ramsey's Theorem, probabilistic methods in combinatorics and algebraic methods in combinatorics. Prerequisites: Math 132, 309 and 310, or permission of the instructor.

Textbook

Recommended book: Invitation to Discrete Mathematics by Matoušek and Nešetril.
I will very roughly follow this book.

For generating functions I may follow some of: Analytic Combinatorics by Flajolet and Sedgewick.

Some other standard books for a course like this are:
Introductory Combinatorics by Brualdi
A Walk Through Combinatorics by Bóna
Combinatorics and Graph Theory by Harris, Hirst, and Mossinghoff

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Exams

There will be 3 midterm exams and a final exam. Your lowest exam score will be dropped. The midterms will be held in class **Sept 20, Oct 18, and Nov 10**. The final will be **Dec 20, 2022, 1-3pm**.

Homework

There will be weekly homework assignments done through gradescope which is accessible through canvas. Homework solutions should be written up clearly and in detail.

Collaboration: You may discuss the homework verbally or on piazza with other students provided you have already given the homework a serious attempt. If you have already solved a problem and someone asks you about it, then any help you provide should consist of hints or suggestions and never complete solutions. In particular, homework should be written up independently and it should not be possible to tell who worked with whom. Do not search or post requests for solutions to HW. Do not post any course materials online. You may always post questions about homework via piazza discussions.

Homework Score

...will be computed as follows. If there are 10 homework assignments with scores $a_1 \leq a_2 \leq \cdots \leq a_{10}$ then your final score will be

$$\frac{\log(1)a_1 + \log(2)a_2 + \cdots + \log(9)a_9 + \log(10)a_{10}}{\log(10!)}$$

In particular, your lowest score is dropped.

Grade breakdown

Homework: 50%
Midterm exams: 30%
Final exam: 20%
Letter grade breakdown: A+=(97,100], A=(93,97], A-=[90,93], similar for B,C,D, F=[0,60).

Piazza

This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email team@piazza.com.

Find our class page at: https://piazza.com/wustl/fall2022/fl2022l24math37001/home

Course plan

Basic counting
Basic graphs
Trees
Ordinary generating functions
Exponential generating functions
Probability in combinatorics
Linear algebra in combinatorics

SageMath

I plan to use the program sage to compute demonstration examples. You may wish to obtain this software but I do not plan to require it.

https://www.sagemath.org/

Health Related information

If you become sick during the semester please let me know as soon as possible so we can make accommodations.